

# **GCOS TECHNICAL SUPPORT PROJECT PACIFIC**



*Bauerfield Hydrogen Building – GUAN Station Technical Survey*

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## **QUARTERLY REPORT JANUARY TO MARCH 2006**

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**METEOROLOGICAL SERVICE OF  
NEW ZEALAND LIMITED**

*28 April 2006*

## **1 Executive Summary**

This is the seventh Quarterly report of the GCOS Technical Support Project – Pacific (TSP) and covers the third period of the 200506 financial year – January to March 2006.

Fiji and Rarotonga were approved as GUAN stations. We will set up formal monitoring for those stations during Q4 to enable us to report their performance. During the quarter, Tarawa performed reasonably well. Penrhyn was again exceptional with no missing flights, but Funafuti encountered two major, consecutive equipment failures. This resulted in about half of the soundings for the quarter being unable to be completed. The Digicora was returned to us for repair and local airline problems at Nadi resulted in us abandoning an engineering visit to repair the Proton hydrogen plant. The program resumed in late April when an engineer was able to travel to the atoll to complete repairs, and new hardware and software installations. Rarotonga continues to operate a pilot balloon program only. The Met Office has kindly approved about NZD 18,000 for components to repair the fire-damaged radar and the Cook Islands Meteorological Service is seeking the balance from NZAID. We understand that the Papua New Guinea has exhausted its supply of radiosondes and the program has reverted to pilot balloon observations.

The GSN Stations performance remains mixed. Some improvements are being achieved at Kiribati as HF radio digital email, a component of RANET (Radio Internet), is being used for communications instead of the local ISP. As this new medium is extended through the region we can expect some improvements elsewhere where the poor performance is a result of communications. The GSN station inspections are progressing slowly. The inspection kit has been received back from Tuvalu. It has been overhauled, recalibrated, replenished and despatched to Papua New Guinea.

Two GSN station inspection kits were constructed and provided to the Botswana TSP. The 200405 Financial Year TSP surplus, together with a further amount approved by GCOS, was transferred from the TSP to the Honiara Refurbishment project. The TSP is also funding a display system at the meteorological office, Faleolo, Samoa, with equivalent funding ex WQMO VCP purchasing radiosondes for a country that is supported by the Pacific TSP.

Garry Clarke re-wrote the CliRep software to correct an error. The corrected software has been copied onto CDs and sent to the Casablanca workshop participants.

The Bauerfield GUAN station refurbishment is progressing well with local work about to start. We plan to complete the project by the end of Q4. Honiara is progressing much more slowly and is likely to be delayed due to the civil unrest in Honiara at present.

## 2 TSP Stations

The following stations are provided for under the TSP provisions.

Station Nr.	Station	Country	GSN	GUAN
91490	Christmas Is (Kiritimati)	Kiribati		
91610	Tarawa	Kiribati		
91701	Kanton	Kiribati		
91503	Munda	Solomon Islands		
91517	Honiara	Solomon Islands		
91554	Tekoa Airport, Santo	Vanuatu		
91568	Aneityum	Vanuatu		
91631	Nanumea	Tuvalu		
91643	Funafuti	Tuvalu		
91650	Rotuma	Fiji		
91652	Udu Point AWS	Fiji		
91680	Nadi	Fiji		
91699	Oni I Lau AWS	Fiji		
91724	Nukunonu	Tokelau Islands		
91780	Lupepau'u	Tonga		
91789	Nuku'alofa	Tonga		
91801	Penrhyn	Cook Islands		
91802	Penrhyn AWS	Cook Islands		
91812	Pukapuka AWS	Cook Islands		
91831	Aitutaki AWS	Cook Islands		
91843	Rarotonga	Cook Islands		
91824	Hanan Airport	Niue		
92014	Madang	Papua New Guinea		
92035	Port Moresby	Papua New Guinea		
92044	Momote	Papua New Guinea		
91960	Pitcairn Is	United Kingdom Territory		

## 3 GUAN Station Performance

### 3.1 Overview

From January 2006 the four operational stations supported under the TSP have been extended to include Nadi and Rarotonga, which were approved as GUAN stations. For Tarawa and Funafuti, the routine operational expenditure is primarily provided by the Met Office. The Met Office also supports the staff costs at Penrhyn while the other station costs have been met by funding from WMO VCP. We understand that this current VCP funding has now terminated and that GCOS has offered to take over component. Current reserves in this component should be sufficient to cover the period until about August 2006. MetService contributes some technical and administration support. The TSP enables the technical assistance already allowed for to be enhanced. Nadi, in fact, is self reliant and requires little, if any TSP support. Rarotonga is presently in-operative until its fire-damaged radar can be repaired.

### **3.2 Funafuti Upper Air Program**

Equipment problems caused a considerable disruption to the programme in Q3. A fault in the Digicora ground station necessitated it being returned to New Zealand for repair, after we had tried remotely talking through a repair with the local technicians. Upon its return to Funafuti following the repair at our workshops the Tuvalu technicians advised that the Proton had failed and there was no gas to resume the programme. We analysed the Proton fault but it was one that we had not seen before. Following discussions with Proton Energies and the supply of a replacement part we scheduled one of our engineers to travel in early April. The aircraft to Funafuti became unserviceable at Nadi, Fiji and after two days, with no assurance from the airline as to when it would again operate, the engineer returned to New Zealand. A repair visit is planned later in April.

Of the 90 possible flights for the quarter, only 38 were received; the last on the 10 February. Three flights were not received in January due to a Proton problem. The local ISP is working again and Funafuti has reverted to using it as its primary communications with the HF digital email as back-up. We have arranged for them to send us a weekly “test” email on the HF radio system to confirm its serviceability.

### **3.3 Tarawa Upper Air Program**

The programme generally operated well during the quarter. To avoid the risk of high ISP charges, incurred with staff not disconnecting the Dial-up service after sending observations, the new Director has restricted the use of email through the ISP to himself. The HF radio digital email is now established as the primary means of communications for meteorological operational messages.

All flights were received in January although five were after the H+2 window due to radio propagation problems communicating directly with Melbourne. Similar issues occurred in February and March. This problem should be at least partly mitigated as the Bureau of Meteorology establishes a second station in Queensland. The concept of a further automatic relay station at Niue should completely resolve the problem. However, this is more an operational issue rather than a climatological one. Four flights were missed in March as a result of Proton power supply problems. These were resolved remotely with the Tarawa technician. Two flights were not received as a result of communications problems.

### **3.4 Penrhyn Upper Air Program**

Once again, Penrhyn has performed exceptionally with all flights being received during the quarter and only one not being able to be sent within the H+2 window. The Cook Islands email service to the Outer Islands is very poor and to meet the

H+2 delivery window, the technician often uses his own satellite cell phone facility. The ensuing “performance” in the H+2 performance indicator considerably masks the true state of affairs with respect to the official communication channel for upper air messages from Penrhyn. This use of the satellite cell phone is a cost to the programme and there would be merit in installing HF digital email, similar to the units we have installed at Tarawa and Funafuti, especially if an automatic relay station at Niue was also completed.

Thanks to the Met Office’s donation of six months supply of radiosondes funded from the savings we achieved from the Digicora upgrades and surplus RS-80 radiosondes from another Met Office supported station, Penrhyn has stocks until about February 2007. However, the costs for the non-staff side of the Penrhyn programme are presently being drawn from reserves that had accumulated over the years. This has resulted from WMO VCP withdrawing from funding in late 2004. GCOS has confirmed its intent to meet these costs in the future subject to funding being available. We are monitoring the available funds and we should have sufficient to last until about August. We will need a commitment from GCOS for future funding by about the end of May to allow time for alternatives to be explored or for the station to close, taking in to account the notice we are required to give the Penrhyn technician.

### **3.5 Rarotonga Upper Air Program**

We have followed up with the Cook Islands as to the progress in our proposal to repair the fire-damaged radar. The Director contacted the Public Service Commission (PSC) to learn that it required the CVs of the engineering staff who were to undertake the work before the PSC would submit to NZAID. These were supplied and we now understand the proposal has been forwarded to NZAID for their consideration.

### **3.6 Port Moresby Upper Air Program**

Largely pilot balloon during this quarter as radiosonde stocks became depleted early in the quarter. There is presently a fault on the Digicora and the diagnosis that the Papua New Guinea technician made without our involvement indicated a fault on an electronics card. This was sent to Vaisala for repair but it has turned out that the card is serviceable and the fault is elsewhere in the Digicora. When the card is returned we will schedule an engineering visit in Q4.

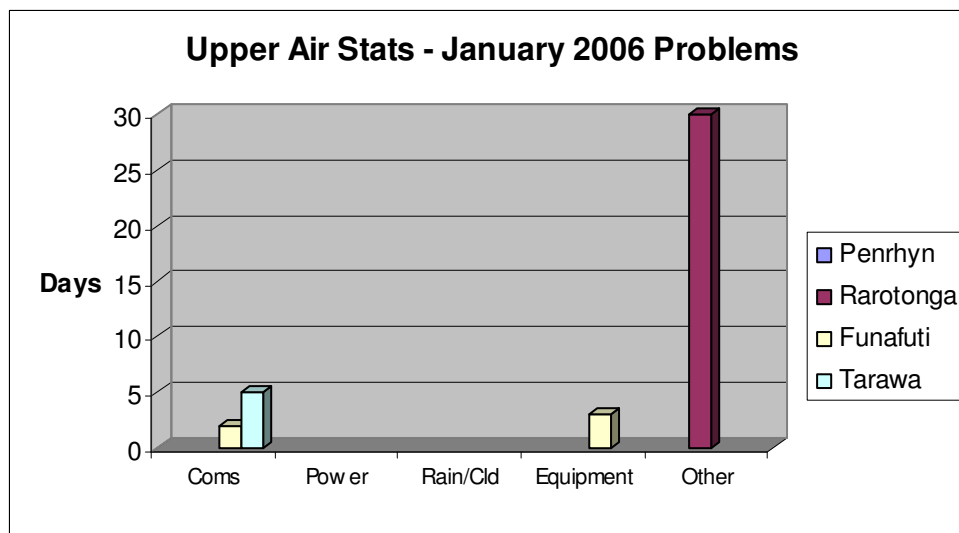
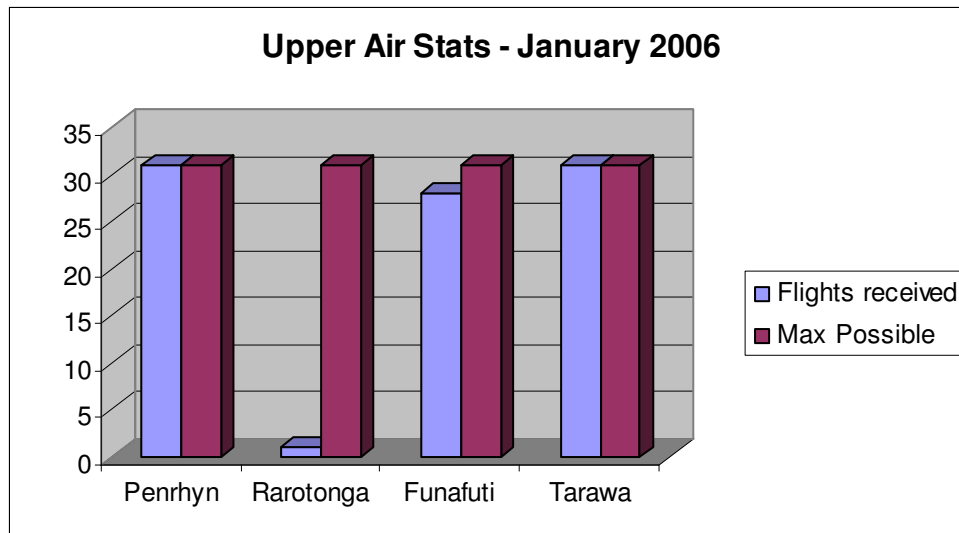
### **3.7 Upper Air Statistics**

The charts are largely self-explanatory.

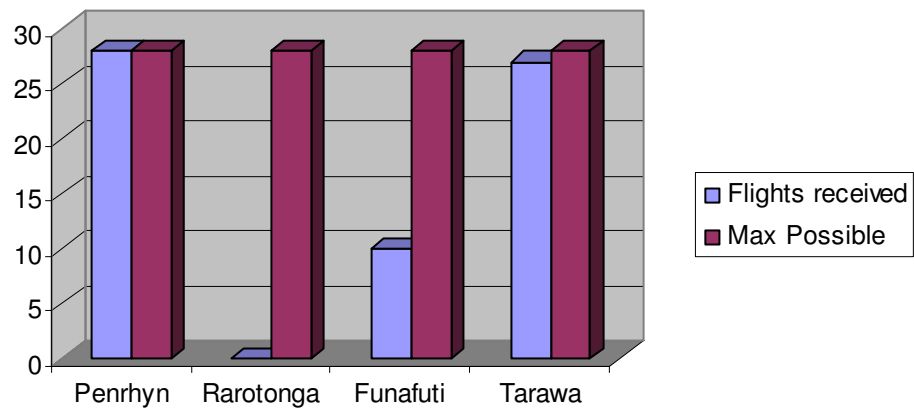
The “Problems” chart provides a breakdown of areas in which problems occurred at the stations. The "Other" category encompasses occasions when no information has been provided from the station and we have been unsuccessful in discovering the

reason. It is also used for depleted stores and annual leave at Penrhyn. The “Rain” category applies to radar or pilot balloon wind finding and signal loss due to strong rain echoes.

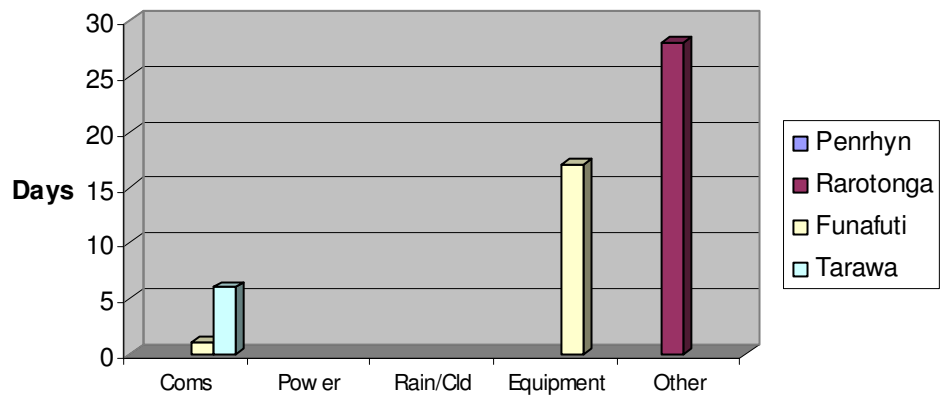
100 hPa is the GCOS MRQ and 5 hPa is the TRQ. We expect to see some fluctuation in the “average” line as only a few early terminations for such reasons as radiosonde failure or an early burst can distort the results noticeably. We are still considering the value of this performance measurement. All stations should be operating 700 gm balloons apart from Port Moresby which has 800 gm balloons. We believe that there is also a station latitude and seasonal effect of balloon bursts. Higher bursts are often evident at lower latitudes together with a seasonal variation.



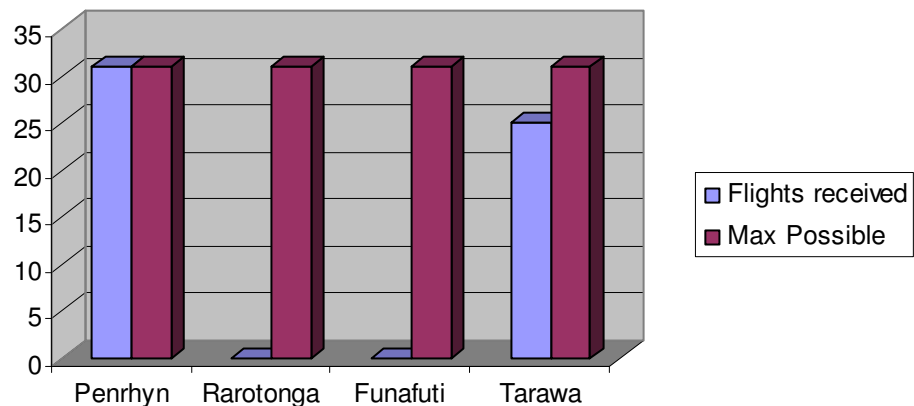
**Upper Air Stats - February 2006**



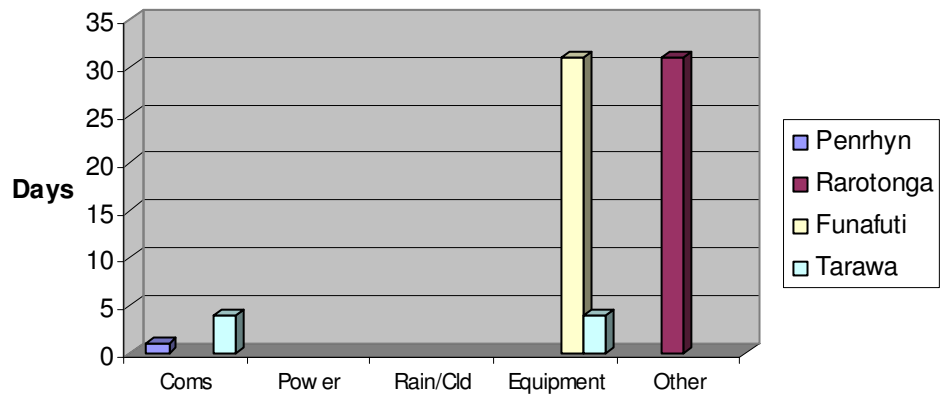
**Upper Air Stats - February 2006 Problems**



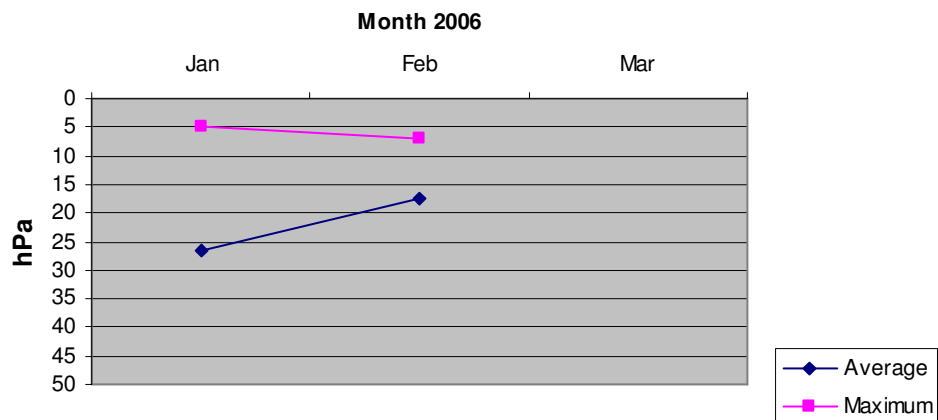
**Upper Air Stats - March 2006**



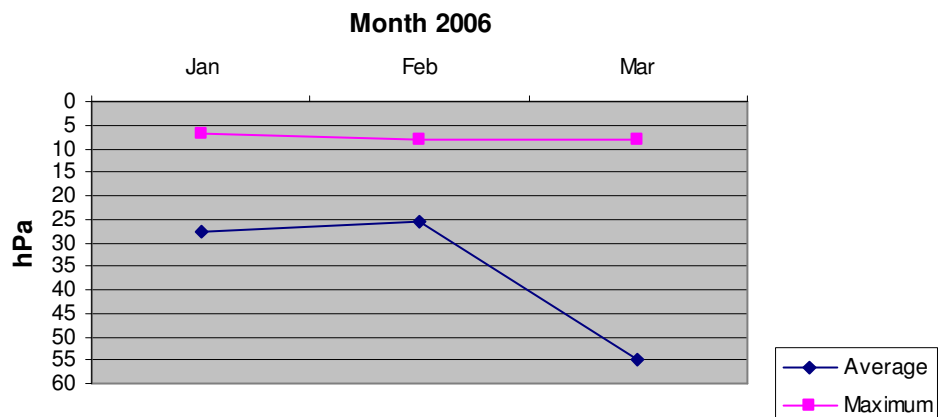
### Upper Air Stats - March 2006 Problems



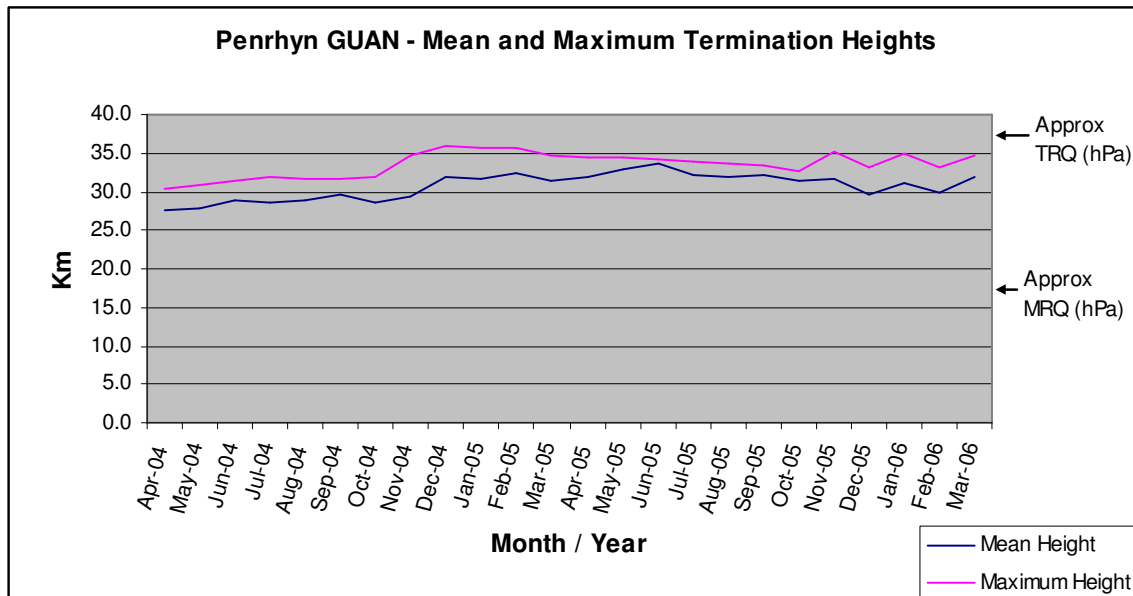
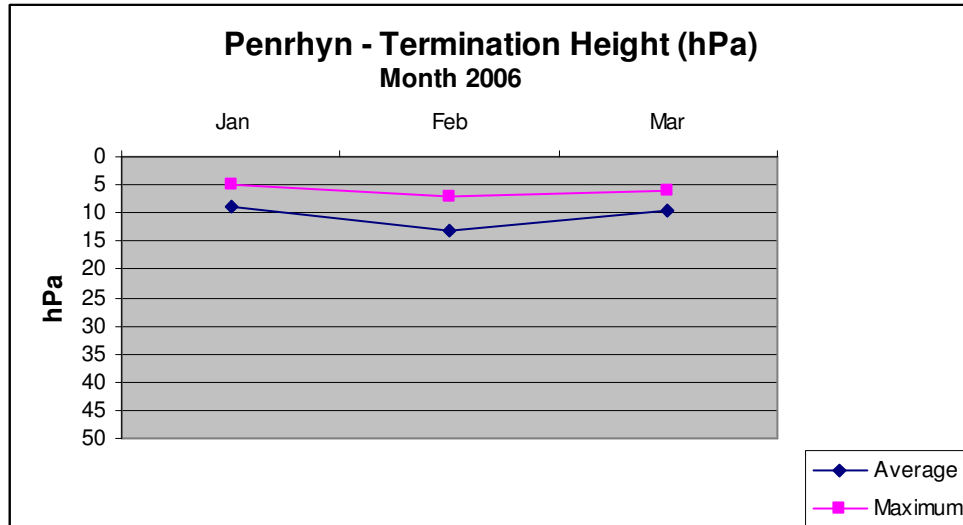
### Funafuti - Termination Height (hPa)



### Tarawa - Termination Height (hPa)





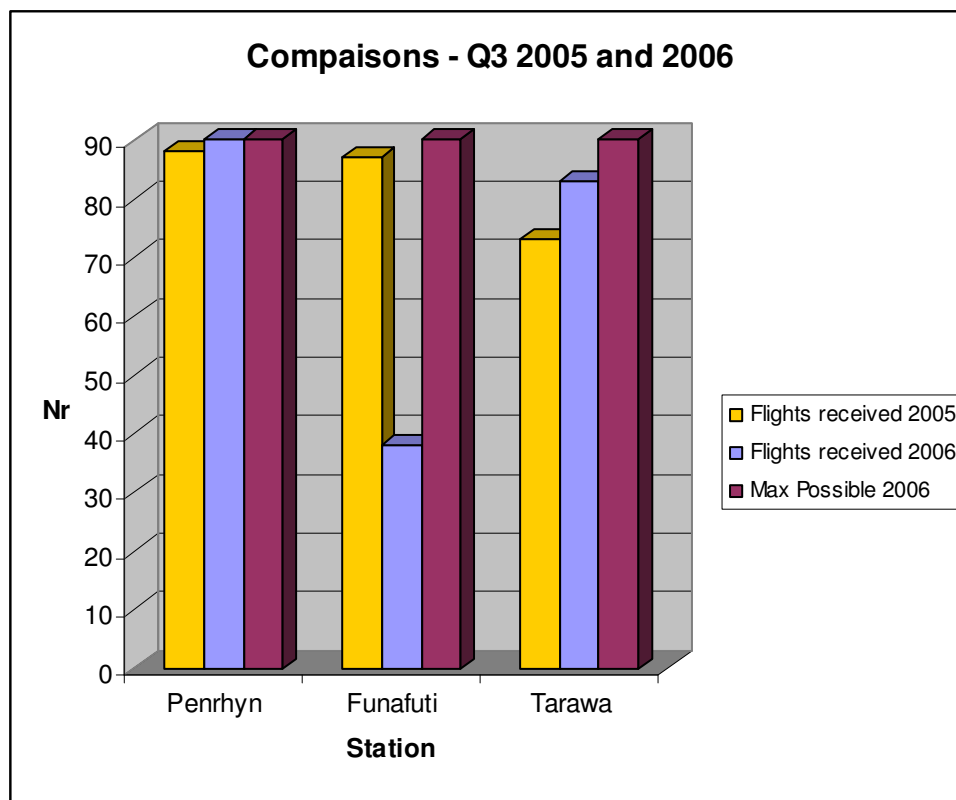


- GCOS GUAN – Target Requirement (TRQ) = 5 hPa;  
Minimum Requirement (MRQ) = 100 hPa.

### 3.9 Climate Temp Messages

Climate Temp messages are produced for Fiji, Tarawa, Funafuti and Penrhyn. We are unclear whether Port Moresby is producing a message but we assume that one would be completed.

### 3.10 Comparison of 2004 and 2005 Results



## 4 GSN Station Performance

### 4.1 Overview

Synoptic reports from GSN stations provide the input to enable the end of month Climate Message to be constructed for each station. Our focus to date has been on the GUAN program – consistent with the GCOS priorities as we understand them.

### 4.2 GSN Station – Missing Synoptic Reports

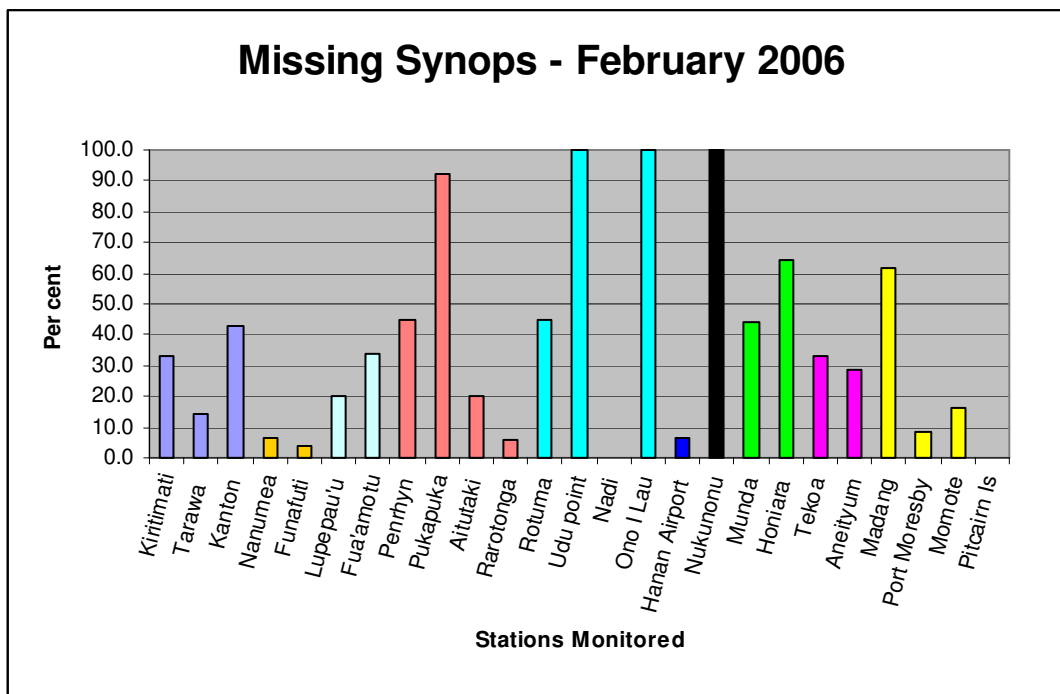
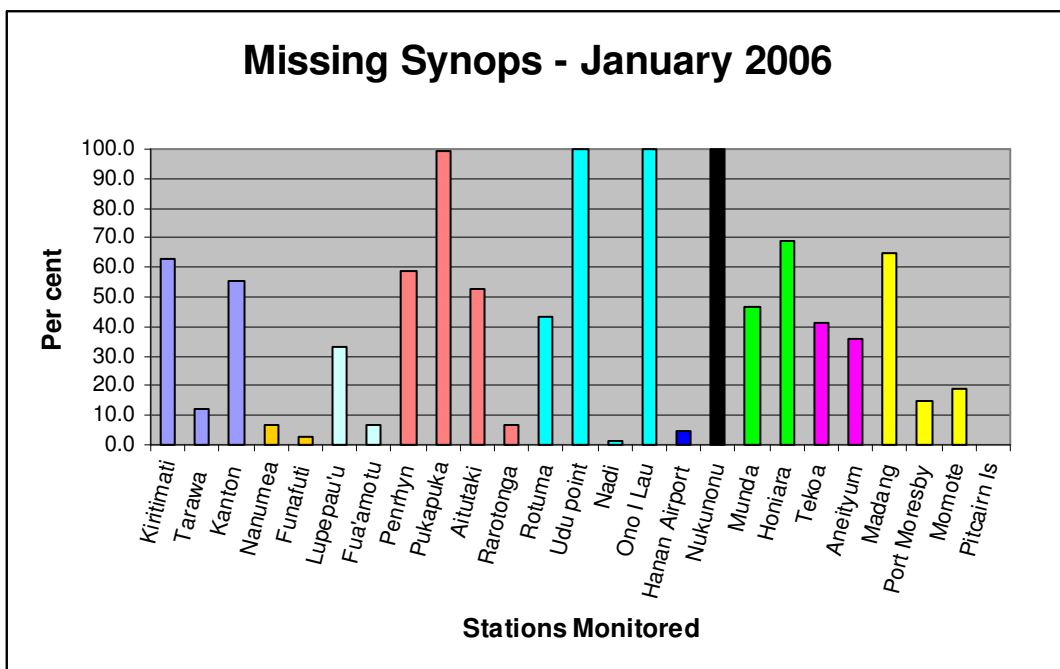
The chart shows the number of missing synoptic reports from the region's GSN stations that are passed through MetService's gateway or currently monitored by MetService.

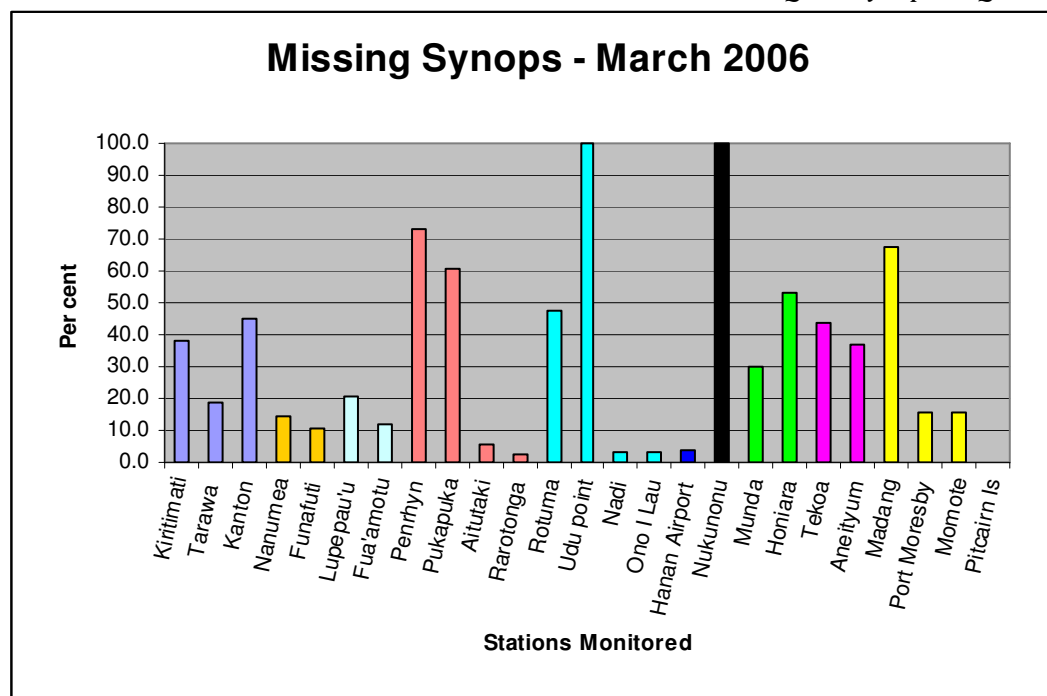
It does not take account of:

- Reports that may have been received by the respective Meteorological Services' Head Offices but not on-forwarded to MetService.
- Reports that may have been rejected due to incorrect bulletin headers.

The total number of synoptic reports possible is determined from WMO Tables showing each station's reporting program. Where it seems that the advised reporting program is not up to date, as far as practicable, we will adjust total number of synoptic reports used in the calculation.

Stations are "colour coded" according to country.





### KEY

Country		Country		Country	
Kiribati		Fiji		Vanuatu	
Tuvalu		Niue		Papua New Guinea	
Tonga		Tokelau		Pitcairn Island	
Cook Islands		Solomon Islands			

## 5 Project activity

### 5.1 GUAN Routine Maintenance

We had planned routine maintenance visits to Tarawa and Funafuti in Q3. The sole scheduled jet aircraft service, which was provided by Air Nauru, was discontinued when the aircraft was recovered by the lease company due to outstanding payments. An intermittent, non-scheduled service has operated since late January. This has proven impractical to use as there is no certainty that any flight will operate. We understand that Taiwan has contributed to the operating costs and that a normal scheduled service will resume in Q4. As soon as this occurs we will schedule a visit.

The fault on the Digicora at Funafuti necessitated it being returned to our workshops for repair. The fault on the Proton, that the Funafuti technician subsequently advised when the Digicora was re-commissioned, required an in-

country visit. This was attempted early in Q3, but not completed due to an unserviceable aircraft at Nadi. It was in progress at the end of April. The in-country visit was costed as the annual routine maintenance visit.

We had planned to extend the Port Moresby routine maintenance visit and include an inspection of the local site works at Honiara GUAN station before traveling to install the Proton and to re-commission the station. With the recent civil unrest at Honiara it is inevitable that the project will be delayed. There is a fault at Port Moresby on the Digicora upper air equipment. We understand from the Papua New Guinea Meteorological Service that they are awaiting a part from Vaisala. When this is received we will schedule an engineer to visit to install the part and check over the Digicora and Teledyne hydrogen plant. This is planned for Q4.

The Bauerfield budgeted routine maintenance visit will not be required this programme year.

### **Tarawa**

A UVR automatic voltage cut out system for poor mains stability conditions was purchased during Q2 and is on site awaiting an engineering visit to install it. The Proton is operating satisfactorily at present although with an intermittent fault.

### **Funafuti**

The voltage protection unit will be installed during the next engineering visit – early in Q4.

## **5.2 GUAN Fault Maintenance**

Both the Digicora and the Proton at Funafuti experienced unusual faults during the quarter. Our engineers attempted to restore both faults initially by remotely diagnosing and talking through with the local technician. In both cases the faults were too complex and this approach was unsuccessful. The Digicora was air-freighted to our Workshops where we successfully repaired and returned it.

Upon its return we were advised that the Proton was unserviceable. The diagnostic tests showed the fault to be one we had not encountered before and we sought advice from Proton Energies. The required part was air freighted from Proton Energies and we scheduled an engineering visit to repair the plant.

Faults on the Proton power supply unit at Tarawa were able to be remotely diagnosed and the system restored. They relate to voltage irregularities. A total of four flights were affected in January. This problem should be resolved as soon as we can complete the engineering visit and install the voltage protection devices. We intend doing this in Q4.

The fault on the Digicora at Port Moresby will be repaired when the part from Vaisala is received. We expect this will be in Q4. However, we understand that the supply of upper air consumables is exhausted so the program will be inoperative until a donor is able to provide a further supply.

### **5.3 GUAN Ground Equipment consumables**

Nil requirements this quarter.

### **5.4 GUAN Technical Spares**

A failed Proton power supply was refurbished by Proton Energies and brought to charge this quarter.

### **5.5 GUAN Country Reimbursement**

Not provisioned this Financial Year.

### **5.6 GSN Stations Training**

Garry Clarke re-wrote the CliRep software to correct the function that calculates the days of thunder and hail in the Climat Report. The revised software was loaded onto CDs and distributed to the workshop participants.

### **5.7 GSN Stations Inspections**

The GSN Station Inspection kit has been returned from Tuvalu where both GSN and other synoptic stations were inspected. The station record sheets were not returned with the kit and we are following this up with Tuvalu. Tonga advised us that they were using the barometer from the TSP kit for calculating pressure as their station barometer was unserviceable. Tonga has asked for a price for a replacement barometer. We will again ask for the kit to be returned. The third kit has been despatched to Papua New Guinea for GSN inspections there. One kit was overhauled and re-calibrated during the quarter. Replacement locks and cameras were purchased.

Ideally, each country should have its own TSP kit, and this would solve the problem of countries retaining the kit and creating delays for other countries.

### **5.8 Reserves**

No reserves are budgeted this financial year.

## **5.9 Program management and administration**

All Vaisala Digicora upgrade kits have now been received and we are working through upgrading all stations. Funafuti and Tarawa will be upgraded in Q4. The kit will be provided to the Penrhyn technician. We will remotely assist him to upgrade the Digicora. The Bauerfield and Honiara Digicoras will be upgraded as part of the refurbishment project and will, therefore, be capable of using RS-80 or RS-92 radiosondes from the time of re-commissioning.

As Bauerfield is scheduled to be restored by 30 June, it is probable that the lead time is too short to enable a supply of balloons and radiosondes to be provided ex WMO VCP. We are investigating whether MetService could provide an interim supply from its stocks which would later be replenished from a WMO VCP order. We should know this by early May and will advise the GCOS Implementation Manager as soon as possible.

Following the Met Office kindly funding six months of radiosondes for Penrhyn from savings we achieved in our Digicora upgrades, the Met Office also supplied a further quantity of RS-80 radiosondes that were surplus to its requirements. Penrhyn now has radiosonde stocks until about January / February 2007.

However, the Penrhyn station funding is of concern. Presently the Met Office funds all staff costs and all other operating costs (pre radiosonde) were kindly funded by WMO VCP. WMO VCP advised, circa September 2004, that it was unable to continue with its support and this was concluded with a final annual payment at that time. The GCOS Secretariat kindly offered to take up that funding requirement, but subject to actual funds being available at any time. Since the withdrawal of WMO VCP funding, the station has been operating on a continuation of the Met Office funding with the WMO VCP reserves that had accumulated over the years due to favorable USD/NZD exchange rates. These reserves will be exhausted in about August 2006. As we are required to give the Penrhyn technician advance notice if the station was to close and his position become redundant we will need to know soon if GCOS is able to provide the necessary financial support to keep the station operating. The amount needed is of the order of USD 27,000 per annum. However, we will refine that in light of current exchange rates and provide budget information to the GCOS Implementation Manager.

Two TSP GSN Station Inspection kits were constructed under the Pacific TSP resources and despatched to the Botswana TSP. They arrived late in Q3.

The surplus from the 200405 Financial Year together with a top up from the 200506 Financial Year for the Pacific TSP was transferred to the Honiara GUAN Restoration project with the approval of the GCOS Secretariat.

The TSP funds were also used to support a surface meteorological data display at the meteorological office at Faleolo, Samoa. This was an approved VCP project

and an equivalent value of radiosondes will be purchased by VCP for one of the Pacific TSP upper air stations.

The Bauerfield GUAN restoration is proceeding extremely well, thanks to a highly responsive technician at Vanuatu Meteorological Service. Quotes have been accepted for the local work which is about to start. The old M28 pressure vessel has been professionally tested and approved for use with the Proton hydrogen plant. The plant is currently under test at our Paraparaumu workshops and will be consigned to Vanuatu on a vessel in May. The station should be re-commissioned by 30 June.

Honiara is progressing more slowly and the recent civil unrest seems certain to delay the completion of the refurbishment. The Proton hydrogen plant arrived at Honiara on 3 March. We recently discovered it had been consigned to UNDP which had yet to clear it and deliver it to the Solomon Islands Meteorological Service. We have advised the Director, Solomon Islands Meteorological Service who will pursue clearance and provide safe dry storage until we can install it. We have checked that there are no special storage requirements required for the plant.

The University of Oklahoma project to provide 50 refurbished rain gauges to the South Pacific countries continues to be managed through the TSP. Little expenditure was submitted for reimbursement in Q3.

Funds for the 200607 Financial Year for the TSP and the PACRAIN project have been received from NOAA and allocated to the respective projects.

A routine program control of activities, coordination, financial planning, management, reporting and administration was undertaken during the quarter.

## **6 Project Activity Planned for Next Quarter**

- Routine support and assistance for GUAN and GSN stations.
- Receive back the TSP kit from Tonga, recalibrate instruments, extract meta-data and enter in database, restock the kits and send to the next TSP countries.
- Complete TSP Program Planning and Budgeting for the 200607 Financial Year.
- Provide the Penrhyn budgets showing funds required early in Q4.
- Provide the Penrhyn Station refurbishment report.
- Complete the Bauerfield GUAN restoration project work.
- Continue the Honiara GUAN restoration project work to the extent possible taking into account the progress of the local work and security issues in-country.



## **7 Financials**

Under separate cover to TSP stakeholders.

## **8 Report Distribution**

- Mr Richard K. Thigpen  
GCOS Implementation Manager  
WMO
- Mr Howard J. Diamond  
U.S. GCOS Program Manager  
NOAA
- Mr Henry Taiki  
WMO Program Officer  
WMO Sub-regional Office for the South West Pacific
- Dr Tokiyoshi Toya  
Senior Program Manager – VCP  
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## **9 Report Preparation**

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